



## Famous names in Rotor Dynamics



**J**acob Pieter Den Hartog, 1901 to 1989, was described by his colleagues and peers as the most important teacher of mechanical vibrations in the world. Born in Java, now the most populated island of Indonesia, he moved to The Netherlands in 1916. He graduated from Delft Polytechnical Institute in 1924 as an Electrical Engineer, but the poor economic conditions of the times caused him to emigrate to the United States. He soon found a job at the Research Department of Westinghouse as assistant to Stephen Timoshenko, a Professor of Mechanics who introduced Den Hartog to the study of vibrations.

Here Den Hartog established his reputation for his ability to solve vibration problems. In one particular case, a torsional resonance was at the same frequency as operating speed, which resulted in broken shafts. He boldly recommended reducing the diameter of the shaft, which most thought would weaken it, but which elegantly solved the problem.

During the day at Westinghouse, Timoshenko kept him busy with vibration problems in railroad electrification, hydraulic power turbines, steam turbines, and transmission lines. At night, he attended the University of Pittsburgh where he received his Ph.D. in mathematics in 1929. After spending 1931 in Germany doing post-doctoral research, Den Hartog joined the faculty of Harvard University.

At Harvard, he published the first two editions of Mechanical

Vibrations, probably the best known engineering text on vibration, and came into his own as a lecturer, researcher, and consultant. As an Electrical Engineer, he had an unusual, intuitive understanding of mechanical problems. He collected an extensive set of demonstration models and published a dozen papers until the Second World War interrupted his efforts, but not his career.

With a commission in the U.S. Navy, he worked on ship vibration problems in the Bureau of Ships. From 1941 until 1945, he was involved in the trials of practically every new type of ship. He left the Navy with the rank of Captain and returned to a new teaching post at Massachusetts Institute of Technology (MIT) as Professor of Mechanical Engineering. He remained at MIT, where he was head of the department from 1954 to 1958, until he retired in 1967 as Emeritus Professor. While at MIT, he produced the third and fourth editions of his book, as well as two additional textbooks, Strength of Materials and Mechanics. From then until his death in 1989, he was in constant demand as a lecturer and consultant.

This is a small insight to a man who had tremendous, positive influence on generations of engineering students and numerous industries worldwide. The power that Den Hartog had was in his ability to explain in simple words and simple models. He liked models and preferred a sketch or diagram to a page full of mathematical equations. He instilled enthusiasm through simple lucid explanations. His capability to question and reject unsound concepts often appeared as an impatience with misguided or

incorrectly presented information. He once used his allotted time at a conference to correct an earlier presentation.

This was a man whose students, colleagues, and peers recognized him with six honorary degrees, honorary membership in major engineering societies around the world, elected him to the National Academy of Sciences and National Academy of Engineering, and presented him with eight major awards, including the Timoshenko and James Watt Medals. These awards not only identified his pioneering research and singular contributions to mechanical engineering, but nearly always commended him for his inspired teaching which "transformed engineering into an exciting challenge for his students."

His ability to communicate the essence of engineering to his students was recognized again in 1981 when the J.P. Den Hartog Distinguished Educator Award was established by MIT. This annual award recognizes a faculty member who, like Den Hartog, "has served as an inspiration for students and has fostered the development of physical insight and engineering judgement." According to Dr. Stephen Crandall, an associate, close friend, and recipient of the Den Hartog Award, this world renowned author, educator, and consultant considered himself, to our benefit, in the following way: "I am a simple man and can only understand simple things." ■

### References:

1. Kossol, L., "I am a simple man and can only understand simple things.", Orbit, April 1985, Bently Nevada Corporation.
2. Timoshenko Medal Committee memo to ASME Council on Honors and Awards, February 1, 1972.
3. Crandall, S.H., Trent-Crede Award presentation, Acoustical Society of America, November 1975.
4. Founders Award Lecture, National Academy of Engineering, November 4, 1981.